PLEC gene

plectin

Normal Function

The *PLEC* gene provides instructions for making a protein called plectin. This protein is produced in many different tissues in the body, including skin and muscle. Within cells, plectin interacts with several molecules that make up the cell's structural framework (the cytoskeleton). For example, plectin interacts with intermediate filaments, which form networks that provide support and strength to cells. Plectin attaches (cross-links) intermediate filaments to one another and to the cell membrane.

The exact function of plectin in different tissues is unclear. In skin cells, this protein is an essential part of structures called hemidesmosomes, which attach the network of intermediate filaments to the cell membrane. It is also a component of desmosomes, which form junctions between neighboring cells. As part of these structures, plectin plays a critical role in anchoring the outer layer of the skin (the epidermis) to underlying layers.

Health Conditions Related to Genetic Changes

congenital myasthenic syndrome

epidermolysis bullosa simplex

At least one mutation in the *PLEC* gene is associated with the features of epidermolysis bullosa simplex, a condition that causes the skin to be very fragile and to blister easily. This mutation has been found in a small number of families with a form of the disorder known as the Ogna type. Researchers are uncertain whether this rare condition is actually a subtype of epidermolysis bullosa simplex or represents a separate form of epidermolysis bullosa.

The mutation responsible for the Ogna type of epidermolysis bullosa simplex changes a single protein building block (amino acid) in the plectin protein. Specifically, this genetic change replaces the amino acid arginine with the amino acid tryptophan at protein position 2000 (written as Arg2000Trp or R2000W). Studies suggest that this mutation may change the way the protein folds into a 3-dimensional shape, which could prevent it from interacting with molecules that make up the cytoskeleton. In the skin, these changes cause epidermal cells to become fragile and easily damaged. As a result, the skin is less resistant to friction and minor trauma and blisters easily.

epidermolysis bullosa with pyloric atresia

At least nine mutations in the *PLEC* gene can cause epidermolysis bullosa with pyloric atresia (EB-PA). In addition to skin blistering, people with EB-PA are born with a life-threatening obstruction of the digestive tract called pyloric atresia. Mutations in the *PLEC* gene account for about 15 percent of all cases of EB-PA.

The *PLEC* gene mutations responsible for EB-PA change the normal structure and function of plectin. Mutations that prevent the cell from making any functional plectin tend to cause more severe signs and symptoms, while mutations that reduce the amount of plectin or alter the protein's structure usually cause milder signs and symptoms. A shortage of functional plectin disrupts the attachment of the epidermis to underlying skin layers, making the skin less resistant to friction and minor trauma. It is less clear how mutations in the *PLEC* gene are related to pyloric atresia.

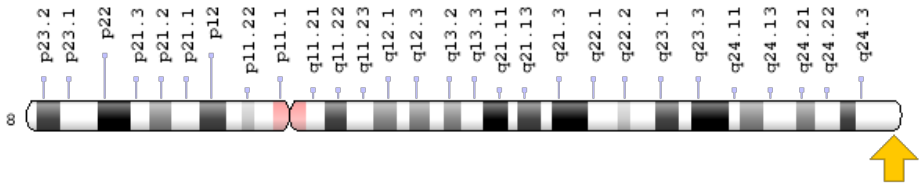
other disorders

Mutations in the *PLEC* gene also cause at least one other form of epidermolysis bullosa known as epidermolysis bullosa with muscular dystrophy. In addition to skin blistering, people with this disorder experience progressive muscle weakness and wasting (atrophy) later in life. More than 20 *PLEC* gene mutations have been found to cause this form of the disorder. These mutations alter the structure, function, or production of plectin. In the skin, a reduced amount of functional plectin disrupts the attachment of the epidermis to underlying skin layers, making the skin less resistant to friction. A shortage of functional plectin in muscle tissue affects critical structures needed for muscle tensing (contraction), which leads to muscle weakness and atrophy.

Chromosomal Location

Cytogenetic Location: 8q24.3, which is the long (q) arm of chromosome 8 at position 24.3

Molecular Location: base pairs 143,915,147 to 143,976,800 on chromosome 8 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- EBS1
- EBSO
- HD1
- hemidesmosomal protein 1
- PCN
- PLEC1
- PLEC1_HUMAN
- plectin 1
- plectin 1, intermediate filament binding protein 500kDa
- Plectin-11
- PLTN

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): Intermediate Filaments Are Cross-linked and Bundled Into Strong Arrays
  https://www.ncbi.nlm.nih.gov/books/NBK26809/#A3019
- The Cell: A Molecular Approach (second edition, 2000): Intracellular Organization of Intermediate Filaments
  https://www.ncbi.nlm.nih.gov/books/NBK9834/#A1814

GeneReviews

- Epidermolysis Bullosa Simplex
  https://www.ncbi.nlm.nih.gov/books/NBK1369
- Epidermolysis Bullosa with Pyloric Atresia
  https://www.ncbi.nlm.nih.gov/books/NBK1157

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28PLEC1%5BTIAB%5D%29+OR+%28plectin%5BTIAB%5D%29%29+OR+%28%28HD1%5BTIAB%5D%29+OR+%28plectin+1%5BTIAB%5D%29+OR+%28PLTN%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D

OMIM

- EPIDERMOLYSIS BULLOSA SIMPLEX WITH MUSCULAR DYSTROPHY
  http://omim.org/entry/226670
- PLECTIN
  http://omim.org/entry/601282

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_PLEC.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=PLEC%5Bgene%5D
- HGNC Gene Family: Plakins
  http://www.genenames.org/cgi-bin/genefamilies/set/939
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=9069
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/5339
- UniProt
  http://www.uniprot.org/uniprot/Q15149

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https://ghr.nlm.nih.gov/gene/PLEC

Reviewed: May 2013
Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
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